

# SUMMARY

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## A Climate Reckoning

The economic costs of BC's extreme weather in 2021

THIS STUDY EXAMINES THE THREE EXTREME WEATHER DISASTERS that beset British Columbia in 2021—the unprecedented heat dome in June, the devastating summer wildfires and the November atmospheric river and flooding—and provides a first-ever estimate of what the combined costs of those disasters were.

It concludes that the cumulative hit to the BC economy from the disasters was between \$10.6 and \$17.1 billion, which is equivalent to 3–5 per cent of provincial GDP.

The study brings a climate justice lens to the economics of extreme weather disasters and concludes that senior levels of government must invest billions of dollars to upgrade

critical infrastructure like dikes to better handle future extreme weather events and therefore better protect all residents, in particular those most vulnerable.

Estimating the full cost of a disaster is not a straightforward exercise. In the immediate aftermath, the first (and often only) estimates are of insured damages to property. As our estimates show, insured damages are but the tip of a large iceberg of damages from extreme weather.

Our framework for the evaluation of economic impacts builds on previous literature in the Canadian context and includes costs associated with:

- Damages to assets and property, including insured and non-insured damages for households and businesses.
- Lost income for workers due to closures or damaged transportation linkages.
- Costs to the public sector, including immediate disaster response, relief and support, longer-term cleanup and recovery and rebuilding of infrastructure.
- Specific impacts on vulnerable and/or marginalized populations such as people with low incomes, renters, seniors, Indigenous people, immigrants and people with disabilities.

The report is also informed by interviews with people on the front lines of the 2021 extreme weather events and these are profiled throughout the full report.

"We lost 100 per cent of our crop. We didn't pick anything. It was just cooking, is what it was. The berries just cooked. I've never lost a complete crop ever in the 30 years we've been doing it. We just had to walk away from it. It was pretty devastating."  
—Bob Nowoselski,  
No's Orchard,  
Creston, BC

## June: The heat dome

The unprecedented heat dome that unfolded over four days in late June shattered temperature records and led to 619 heat-related deaths. Based on historical data, this was estimated to be a one-in-1,000-year event, but with a warming planet we have to assume such extreme heat will happen again and with growing frequency.

The heat dome led to severely damaged crops in the Okanagan and Kootenay regions as well as the Fraser Valley. In the Okanagan some 50–70 per cent of cherry crops were affected, with some orchards losing the entire crop. Over 650,000 chickens and other poultry died.

The heat dome was associated with widespread loss of income due to closures, particularly for those paid hourly wages and whose work was outdoors or in non-air-conditioned spaces. Across the most affected sectors, such as food services, construction, agriculture and manufacturing, we estimate that between \$205 million and \$328 million in income was lost. Heat waves are also associated with general productivity declines which, over the four days of maximum temperature, amount to an additional \$34–\$84 million in lost productivity.

Extreme heat events make bad conditions deadly for the most vulnerable workers. Farm workers, including large numbers of migrant workers, are particularly vulnerable to the

heat, which intersects with long work days, difficult working conditions and substandard accommodations.

A key labour aspect of the government response is emergency services. During the peak days of the heat dome, 911 calls doubled relative to normal. Emergency services were overwhelmed, resulting in significant physical and mental health tolls on paramedics and related workers.

BC Hydro set the province's all-time summer peak hourly demand record on June 28, 2021. We estimate British Columbians spent an additional \$8–\$14 million on electricity for cooling homes and offices during the heat dome.

## July to September: Summer wildfires

An abnormally dry spring in 2021 set the stage for the third-worst wildfire season in BC's history. The largest wildfires significantly affected BC's overall carbon balance, with the 2021 wildfires generating about 122 million tonnes (Mt) of CO<sub>2</sub>, nearly double BC's official greenhouse gas tally of 64.6 Mt in 2020.

The wildfire starting June 30 that destroyed the town of Lytton caused \$102 million in insured damages. There has been ongoing criticism in BC over the slow cleanup and rebuild of Lytton. The White Rock Lake fire in the Okanagan destroyed the community of Monte Lake overnight, with insured damages estimated at \$77 million for 800 properties. Based on typical gaps in insurance industry coverage, we estimate non-insured damages at between \$179 and \$501 million.

Fires and smoke prompted 181 evacuation orders and 304 evacuation alerts, and displaced almost 33,000 people. We estimate the value of work time for those people displaced from their homes ranged from \$33 to \$99 million in lost income.

Supply chain impacts were substantial as fires affected both CN Railway and Canadian Pacific Railway networks causing a backlog of freight deliveries in early July, with a key transportation blockage in the Fraser Canyon between June 30 and July 5 which stranded thousands of rail cars. Workers were also affected by supply-related closures created by backlogs of shipping containers through the Port of Vancouver, and some shipments were rerouted outside Vancouver.

These labour market impacts are significant and we estimate \$281–\$463 million in losses due to work slowdowns in key affected sectors. Interestingly, the impacts in key industrial areas are fairly modest due to fewer numbers of workers affected. Less obvious, but perhaps more important, are economic losses for sectors with larger numbers of workers, such as retail trade and accommodation and food services.

The costs of the public response to wildfires falls mainly on firefighting efforts. A record \$719 million was spent on firefighting compared to a budgeted allocation of \$136 million. Going

"You've got to recognize the damage that today's fires are doing. The classic one-to-two-kilometre buffer won't do anything now because today's fires are moving so much quicker. So much more energy is being released and that energy can transport embers far greater distances than previously."

— Bob Gray, wildland fire ecologist.

back to 2008, the average cost of fighting fires in BC is \$301 million per year. Compounding the challenges for those fighting the wildfires were shortages of critical equipment, including pumps and hoses, and an inability to staff crews due to the COVID-19 pandemic.

Indigenous people are particularly at risk from wildfires. Several First Nations reported inadequate communications on the part of the province during the wildfires. Due to their impact on traditional economic activities like fishing, hunting and trapping, uncontrolled

wildfires have greater direct consequences for Indigenous communities. In situations where rapid evacuation is needed, low-income households, people without vehicles, or those who are unable to drive are made more vulnerable in areas affected by wildfire.

"We started at approximately 4:15 a.m. and we had the complete diking system around the building by 8:30 or 9. We would have lost it if we didn't."  
—Kevin Vilac, chief operator of the City of Merritt's water and wastewater systems, on the race to save some of the city's critical infrastructure during November 2021's intense rains and devastating floods.

While the fires were largely in the interior of the province, smoke flowed down BC's valleys, affecting air quality hundreds of kilometres away, including for about three million residents in the Lower Mainland. Particulate matter in wildfire smoke is bad for human health and has important economic ramifications: smoke adversely impacts outside workers and undermines productivity for other workers who do not have access to decent ventilation and/or who may have pre-existing conditions such as asthma.

## November: Atmospheric rivers and the big flood

Wetter conditions prevailed in September and October with double the normal precipitation, setting the stage for a tragic November. Once dubbed the Pineapple Express, the South Coast experienced seven "atmospheric rivers" in November. The atmospheric river beginning November 13 unleashed massive amounts of rain over the next two days, with some places getting between 200 and 300 mm. The result was extensive flooding in the Fraser Valley near Abbotsford as well as in Princeton and Merritt in the Interior.

Public costs are still being tallied and will run into the billions of dollars. These costs were not stated in the 2022 BC Budget and some costs may be absorbed from the regular transportation and infrastructure budget. The most notable public infrastructure impacts include:

- Failure of dikes in the Fraser Valley, Merritt and Princeton areas.
- 24 highways closed including Highways 1, 3, 5 and 99 that connect Vancouver to the rest of Canada.
- Landslides on Highway 7, stranding some drivers between Agassiz and Hope, and on Highway 99 where five people were killed.
- Damage to five bridges and closure of 20 sections of the Coquihalla Highway 5, loss of bridges and large sections of roadway in 25 locations of Highway 8.
- Damage to the Malahat Highway (the principal connection between Victoria and mid-Island) and other flooding near Duncan on Vancouver Island.
- Damage to an unspecified number of secondary roads and highways.

In 2021/22, an additional \$522 million was spent on disaster and emergency assistance related to the November floods. BC Budget 2022 has committed \$400 million in 2022/23 and another \$1.1 billion over three years in contingencies for flood recovery. In addition, the federal government has promised \$5 billion for flood relief.

Insured damages are reported at \$675 million as of June 2022. The insurance industry pays about 12 cents per dollar of damage from overland flooding, implying about \$4.7 billion in non-insured damages. Even if we assume that private insurance covered a higher 30 per cent of total damages, non-insured damages would be approximately \$1.5 billion.

There were damages to private rail lines that serve as key transportation infrastructure for Canadian resource industries. CN Railway and Canadian Pacific Railway services didn't see a return to pre-flood productivity and capacity until December 21, more than a month after the washouts. Supply chain impacts from the loss of the rail network also led forestry companies to curtail production and hampered the export of Canadian grain.

The Trans Mountain Pipeline, which connects the Lower Mainland to Alberta crude oil and refined fuel supplies, was shut down during the immediate recovery period, leading the Parkland refinery in Burnaby to have down time between November 22 and December 15.

We estimate labour market impacts arising from the flooding based on known disruptions locally and supply chain impacts ranging from \$0.8 to \$1.4 billion, and only count BC workers not potential supply chain impacts outside the province. In addition to these losses, the flood-related displacement of 17,000 people translated to between \$68 and \$153 million in lost income.

Agriculture impacts were extensive to the more than 1,100 farms over 15,000 hectares in the Sumas Prairie in Abbotsford. Losses include 630,000 chickens, 12,000 pigs and 450 cows. Milk and egg production in the Lower Mainland was disrupted by the flooding, and some 2,500 acres of blueberry production were affected, almost one-tenth of the total 27,000 acres of land in BC for blueberry cultivation. About 200 farm workers from Mexico were displaced to Abbotsford and Chilliwack shelters and most were subsequently repatriated.

Part of this story is the failure of the BC government to invest in dike upgrades in spite of many warnings. The cost of upgrading dikes in the Lower Mainland has been estimated to be \$9–\$10 billion. This cost raises questions about whether some dikes should be replaced, improved or abandoned. Dikes are currently a municipal responsibility and local governments are hard-pressed to raise such large amounts of funding for dike upgrades.

“In November, we had about 45 people on staff that we had to lay off. The only person that we were actually able to retain was our finance person, and she worked remotely and made sure we kept paying our bills, because even though we were in a flood situation, people still needed to be paid.”  
—Caroline Mosterman,  
Sumas Prairie farmer,  
on the fallout for farm  
workers post November  
2021’s floods.

## Summary of economic costs

The costs of the devastating climate events discussed in this report are summarized in Table S1. In all, they sum to \$10.6–\$17.1 billion, equivalent to 3.1–4.9 per cent of provincial GDP. The commonly reported statistic of insured damages sums to \$854 million, or only 5–8 per cent of the total. Based on industry statements about coverage, we estimate non-insured damages of \$1.7–\$5.1 billion. These are costs borne almost exclusively by households and businesses.

The BC government has spent a huge amount of public funds on fighting fires and other emergency responses. A large share of costs are government expenditures for replacement of infrastructure. Combined, these total some \$6.1–\$7.6 billion, or 46–60 per cent of total economic costs.

TABLE S1: SUMMARY OF ECONOMIC COSTS

	Low	High
<b>Heat dome</b>	millions of dollars	
General productivity	\$34	\$84
Income losses	\$205	\$328
Incremental electricity consumption	\$8	\$14
<b>Wildfires</b>		
Insured damages	\$179	\$215
Non-insured damages	\$179	\$501
Income losses	\$314	\$562
Public expenditures	\$1,023	\$1,216
<b>Atmospheric river flooding &amp; landslides</b>		
Insured damages	\$675	\$675
Non-insured damages	\$1,575	\$4,950
Income losses	\$897	\$1,531
Public expenditures	\$5,520	\$7,020
<b>Total economic costs</b>	<b>\$10,609</b>	<b>\$17,097</b>

In addition, the lost income of workers and businesses is substantial and under-reported. Our research also points to large labour market costs that are typically overlooked when damage reports are made. Totalling the estimates made above, we get a total labour market impact of \$1.5–\$2.6 billion or 15 per cent of total economic costs.

The 2022 BC Budget supports new planning efforts for adaptation, emphasizing prevention and protection, and a new Climate Preparedness and Adaptation Strategy was announced. However, just \$513 million in funding is allocated over four years, of which \$221 million was already spent in 2021/22. This funding had been previously announced, and much of the plan is still at the stage of data-gathering and the development of high-level principles.

Ideally, both federal and BC governments step up to commit substantial fiscal resources commensurate with the damages we have seen – from upgrading dikes to wildfire control to ensuring cooling systems are widespread. The fiscal implications are stark but doable: many billions of dollars in upgrades to infrastructure are needed so that they can better handle tomorrow’s extreme weather events, and better systems can be developed to minimize adverse impacts during disasters and accelerate rebuilding in the aftermath.

Continued failure to rein in greenhouse gas emissions globally guarantees that these extreme weather disasters will only get worse in the future. Just as extreme weather disasters are an outcome of our collective failure to limit emissions at a global level, the solution lies in collective action, solidarity and quickly ending the reign of fossil fuels

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# Vancity



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